

Philo Farnsworth,

INVENTOR



ANTOR

A Memoir By Elma "Pem" Farnsworth

The inspiration for electronic television came to Philo Farnsworth after he read about mechanical television at that time called "Radiovision." To him, the large spinning discs, used for both transmitting and receiving the picture of these mechanical systems, were clumsy, inefficient, and potentially dangerous. He had just learned about the electron, mighty midget at the heart of electric power. He had been amazed at its endless capabilities. He read that these (to him magical) particles could be diverted in a vacuum by a magnetic field. Also, that a stream of electrons striking a photo-sensitive surface would produce light. This led him to the conclusion that he could produce television with no moving parts by the use of manipulated electrons. This was the summer of 1920, radio was still in its infancy, and Philo Farnsworth was a farm-bred lad of thirteen.

For a year Philo studied everything he could find on electricity, magnetism, relativity, optics, and kindred subjects. By the following spring, his ideas were taking shape. One day, while operating a horse drawn disc-harrow, he looked back over the long even rows he had made with the harrow and, like a flash, everything fell into place. He would scan the optical image row after row, from left to right, as you would read a page of print. This would be converted into an electron image. The charge of each spot would correspond to the light value of that particular part of the optical image. He became so excited he almost lost control of his team.

It was not until 1922 that Philo finally disclosed his television ideas. He approached his high school chemistry instructor, Justin Tolman, and drew a diagram of his complete television system on the blackboard, explaining it to his teacher. Mr. Tolman said it looked like a very good idea, but was a bit beyond his understanding. Philo then took a page from the small notebook he always carried and drew a sketch of his camera tube, later to be called the "Image Dissector." (Mr. Tolman produced this very page twelve years later, when he was called to testify for Philo in the now famous patent interference case with Dr. V.K. Zworykin.)

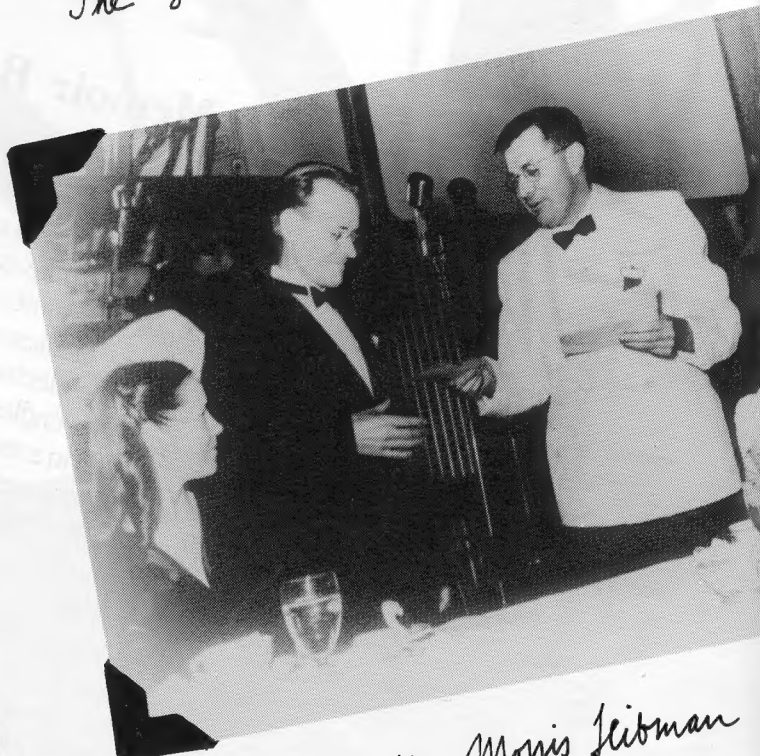
The death of his father, in 1924, was a tremendous blow to the young man. Suddenly, the responsibility for his family's welfare fell upon his shoulders. Seeking a solution, he enlisted in the Navy for a brief stint, but soon gained his release. Then, working as a part-time janitor, he returned to Brigham Young University. It is here that we enter "Pem" Farnsworth's memoir of her travels with Philo and their quest to develop the first all electronic television.



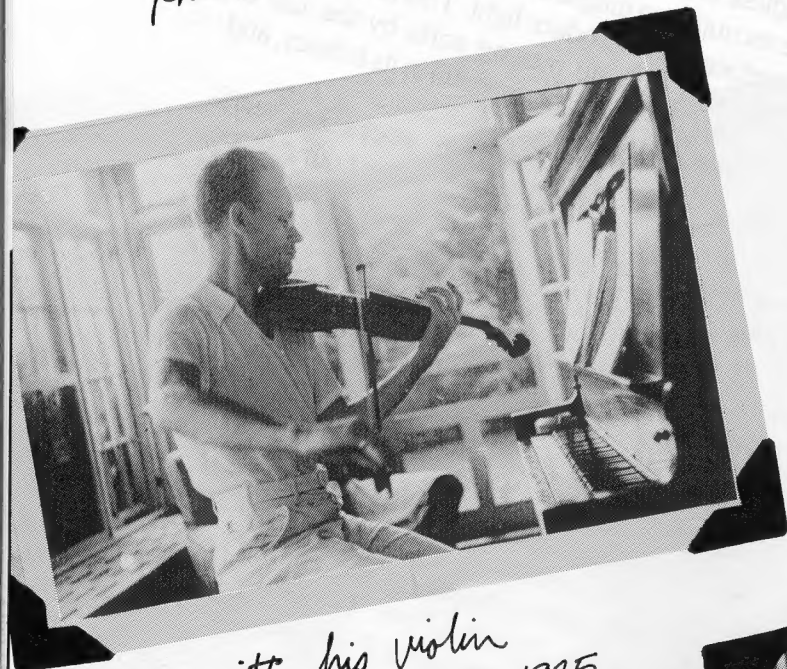
Phil in San Francisco, 1951



The lab on Greene Street, 1932



Phil received the Morris Libman
M Memorial Prize, June 24, 1941
Detroit



Phil with his violin
Philadelphia about 1935

Phil holding dissector
(camera tube)
1927



*I*t was shortly after Phil's return from the Navy that he and I met. My family had moved to Provo at the same time and for the same reasons as did the Farnsworths, education. Phil's sister, Agnes, and I had become good friends at the Provo High School. When she introduced us I was impressed, but romance was far from my mind. After all, I was only a lowly sophomore and he was a college man.

When Phil learned that my brother, Cliff, played the trombone and I played the piano (after a fashion) he frequently came over with his violin. Although he occupied the first chair in the violin section of the BYU Chamber Music Orchestra, he never forgot the fun he had in Rigby when he was part of a four piece dance orchestra organized and led by his music teacher, Miss Critchlow.

Our families were so compatible that when the other side of the duplex where the Farnsworths lived became vacant, the Gardners moved in. My mother had been in failing health and Mrs. Farnsworth's friendship did much to bolster her courage.

There were no jobs to be had the next year, making it necessary for Phil to go to Salt Lake in search of work. He took any kind of job he could find, sweeping streets, cleaning Pullman sleeping cars and ending up with a low paying job in an electric company making minor repairs on small appliances.

Phil and I dated occasionally, mostly attending dances at the "Y." It wasn't until Christmas eve of 1925 that we acknowledged that our futures were inescapably entwined. It was clear to both of us, however, that we needed more education to prepare us for the future we wanted. Of course, I had heard nothing of the invention that was locked away in his mind. He told me later that he was afraid I would think he was talking through his hat. This had happened to him before in his attempts to get backing for his work, and he couldn't stand getting that reaction from me.

My mother passed away the next January, leaving me the eldest of the five children at home. Phil was a tower of strength to me. His daily letters and week-end visits kept me going. He talked Cliff into going to Salt Lake where they assembled crystal radio sets in the basement of a boarding house where they lived. It was not a very lucrative business, however, because they had to practically starve themselves to buy parts. It was well that motherly Mrs. Thomas, who ran their boarding house, saw to it that they had a nourishing supper every evening.

About the time Phil was getting so discouraged that he was contemplating selling his invention to a magazine in the form of an article, Dame Fortune smiled on them. They were hired by two California campaign organizers, George Everson and Leslie Gorrell, who had been engaged to launch the Salt Lake Community Chest. They became interested in Phil's television invention and offered to invest \$6,000.00 to get him started.

A partnership was formed, which they called Everson, Farnsworth & Gorrell. Phil was to have 50% of the venture, and the two investors were each to have 25%. They had one stipulation, Phil was to go to California to begin his work. Phil said this was fine with him, if he could get married first. This was something they had not expected, but since they didn't want his mind to be back in Provo with his sweetheart, they agreed.

When Phil called and asked if I could be married in three days I almost went into shock. I didn't see how I could possibly leave my family responsibilities. But when Phil came home and explained to me and our families about his big chance, everyone rallied around and three days later (May 27, 1926) we were married in a simple home wedding by Brother Knight, our L.D.S. Stake President.

Mr. Everson had loaned Phil his Chandler roadster for the occasion. After driving me to Salt Lake and getting me settled in the hotel room he had reserved he went to return the car. We were to leave at six the next morning.

Left alone I was finally able to catch my breath and pinch myself to make sure it wasn't all a dream. One thing was certain, I was married to the most wonderful man in the world. Could it be real, that after all our sorrows and hard times, we were at last getting our big chance?

This elation began to wear thin as time went by and Phil still had not returned. My feelings of neglect had begun to give way to concern for his safety before I heard his key in the lock. He was very remorseful at having to leave me for so long. He explained that Mr. Everson had many details he though needed going over before Phil left, since they would be staying in Utah to finish up. I told him nothing mattered, now that we were together.

"Pemmie," Phil said seriously, "I have to tell you that there is another woman in my life." Seeing the hurt look in my eyes, he quickly added, "and her name is 'Television'. As I see it, the only way we will have enough time together, is for you to have a part in my work. Together, no telling how far we will go . . . how about it?"

"But Phil, I could never understand it." I protested.

"You can if you want to," Phil assured me, "because I'm going to help you." (This was the beginning of our forty-five years of close companionship.)

The next morning, amid tearful goodbyes and warnings of the sins of the big city from our parents who had come to see us off, we embarked on the exciting Pullman ride to Los Angeles.

In the first floor flat we rented in Hollywood to begin our work, we found it necessary to draw the blinds in order to test Phil's light relay set-up. This led to an LAPD raid and accusations of operating a liquor still. This was during prohibition days and such practices were very much frowned upon. Viewed from the neighbor's standpoint, it did look suspicious, especially with George Everson winding deflecting coils in the backyard.

Soon it became apparent that more money was needed. While Phil was writing up a disclosure, Les, a graduate mechanical engineer, made finished drawings from his sketches. I picked up many pointers which were a big help because Phil decided from the first that I should take over the drawings in his notebooks.

At Phil's insistence, a disclosure was to be made to a patent attorney before discussing his ideas with anyone else. They made an appointment with the firm of Lyon & Lyon in Los Angeles. Dr. Mott Smith from Cal Tech was called in to evaluate the merits of the invention for the benefit of George and Les as well as possible future investors.

During the session, which lasted most of the afternoon, Richard Lyon, the technical partner of the firm, got up and paced the floor in his excitement, exclaiming, "This is a monstrous idea! . . . the audacity of this young man's intellect!"

Dr. Smith said he saw no reason why it wouldn't work, but it would not be easy. As for its being original, he had been following this "television thing" quite closely and had not seen any report of other work along this line. In answer to George's question of "how could we be sure," Leonard Lyon said a patent search should reveal if indeed there *was* anything. George told him to go ahead with it.

The three partners left the meeting walking on air.



Elma G. Farnsworth

The next morning George left on his quest for backing. By the end of the week he had come to the end of what he thought were good prospects. These people had never heard of television. To them it was some nebulous, intangible sort of thing, much too far in the future to expect any reasonably immediate returns.

He finally went in search of Jesse B. McCargar, a vice president of the Crocker National Bank in San Francisco. They had worked together when George organized Californians, Inc. Disappointed to find him away on vacation, he turned to go but was stopped by J.J. Fagan, executive vice president of the bank.

James "Daddy" Fagan was a crusty, colorful product of the Gold Rush Days and had a name for being a conscientious guardian of the money bags. To his offer of help, George told him it was nothing to do with regular banking. It was a wildcat sort of thing that would be of no interest to such an astute banker as he was known to be.

This captured Mr. Fagan's interest and he demanded to hear more. After George finished telling his story, Mr. Fagan spat tobacco juice with great accuracy at a gold spittoon in the corner. Then, leaning back in his chair, he put the tips of his fingers together in a reflective mood and thought a moment. Suddenly, he sat up and said, "It's a damn fool idea, but somebody ought to put some money in it . . . Someone who can afford to lose it."

After rejecting one prospect after another he seemed to come to some decision. He asked George to have his young inventor come from Hollywood and he would set up an appointment with an engineer he knew and Roy Bishop, engineer-turned-industrialist, on whose judgement he could rely.

Phil arrived the next morning looking very much like the poor inventor that he was. George whisked him to the Knox Shop, one of San Francisco's finest men's outfitters. Then, at Phil's suggestion, they went to George's barber for a haircut. As George had planned, this added greatly to Phil's self-confidence.

They met their *appraisers* for luncheon the next day at the elegant Palace Hotel. Mr. Bishop was a gracious host and listened carefully as Phil presented his ideas. After lunch, they went to Mr. Bishop's office, where Phil answered all of their questions unhesitatingly. Finally, Mr. Bishop said it looked like a very good idea, but he doubted Phil's ability to bring it to any kind of commercial reality. With this, Phil packed up his papers and

picked up his hat, indicating to George the interview was over.

As they were leaving, Mr. Bishop asked them to wait a minute while he conferred with his friend. He then decided that they should look into it further. The final decision, after a question and answer session with a group of San Francisco's leading financial wizards, was to back Phil. They would provide a budget of \$1,000.00 per month for one year, with an additional \$13,000.00 for contingencies. Phil promised them a transmission within that year. The backers were to have 60% of the venture, Phil 20%, George and Les 10% each.

Phil immediately sent a wire to Cliff, who was then working in a box shop in Oregon, saying,

HAVE SAN FRANCISCO BACKING STOP MEET US CORNER CALIFORNIA AND POWELL EVERY DAY AT NOON UNTIL WE GET THERE STOP PHIL.

Then he came to Hollywood for me. We were to drive George's Chandler back to San Francisco, since George had to leave for El Paso, Texas, for another campaign.

Driving through fragrant orange groves with the top down, we were two very happy people. It seemed that the world was our oyster and we burst out in a popular song of the day, "Looking at the World With Rose-colored Glasses, Everything is Rosy Now." When we tired of singing, Phil began talking about television and what it would do for the world. He saw it as an excellent educational tool as well as an entertainment medium. His idea was to broadcast over cables and charge the customer to avoid having it controlled by the almighty advertising dollar.

We found Cliff at his post and Phil took us to the place we were to work. W.W. Crocker, son of the founder of the Crocker Bank, was backing a project at 202 Green Street and we were to rent the other half of the second floor space. So it was that Phil began with a bare loft, little experience and a *big* job ahead of him.

Phil turned a deaf ear to those with whom he consulted who warned him he was trying to do the impossible. His creed was, "nothing is impossible, it just takes a little longer" and he proved it time after time. His faith in himself and Cliff carried him through. Within eight months, Cliff was building tubes other glassblowers had called impossible. They were breaking new ground so often, they had to invent the tools to make the tools they needed.

Their biggest problem was amplification. They built their own screen-grid tubes before they were on the market. When he was blocked one way, Phil just invented his way around it. For the last two months of his allotted year, he was able to hire two engineers to assist with the amplifier problem. Up to that time, and until we started our family (Philo T. born 9/23/29), I assisted in the lab. I served as an extra hand, spot-welding delicate tube components and other such jobs. I began what turned into a life-long job as his personal secretary and draftsman.

September 7, 1927 was the big day. The transmitter was to be connected by cable to the receiver in the next room. George Everson was on hand for the big event. We all stood around waiting for Phil to make the final adjustments. Cliff was at the transmitter with an opaque square of glass with a line made transparent in the center. Finally, Phil called, "Put the slide in, Cliff."

At once there appeared a fuzzy line on the tiny screen. Phil fiddled with the control knobs and there it was, an unmistakable line. We stood there hardly believing our eyes. Then Phil said, "There you are . . . electronic television!" This broke the spell and we all expressed our feelings in different ways. When Cliff saw it he said, "Well, I'll be damned!" Carl Christensen, one of the new engineers, overcame his skepticism to say, "If I wasn't seeing it with my own eyes, I wouldn't believe it!" I was dancing around in my relief and excitement. George was slapping Phil on the back

and congratulating him. Phil was beaming with the light of achievement in his eyes. Then, sobering, he said, "This proves we can do it, but we still have a long way to go."

Les Gorrell was in Los Angeles at the time, but had been a frequent visitor to the lab. He would stride in with a big grin, slap Phil on the back and say, "Haven't you got that damn thing to work yet?" So Phil sent him a wire saying, "THE DAMN THING WORKS."

Although Phil had beat his promised year by three weeks, it took him several more months to get a two-dimensional picture to show his backers.

They assembled at the lab on Green Street. There was W.H. Crocker, founder and president of the bank; his son, W.W. Crocker and J.B. McCargar, vice presidents; James J. Fagan, executive vice president; Roy N. Bishop and Mr. R.J. Hanna, president of Standard Oil of California.

While waiting for Phil to arrange things at the transmitter, the men became a bit restive and Mr. Fagan called out, "Farnsworth, when are we going to see some dollars in this gadget?" Phil was ready for this. Almost immediately, there appeared on the small screen an unmistakable '\$' sign. This made a hit and put them in a receptive mood and Phil went on to show them a triangle and other geometric shapes. Then they blew smoke in front of the camera and swirls came over distinctly, proof that televising movement would be no problem.

By that May, Cliff was able to build Phil the dissector with the flat lens end he had been waiting for. This was another feat they had been told was impossible. The lens end cut out much of the distortion and made a big improvement in the picture.

The backers now decided it was time to sell out and take their profits. Up to this time, Phil had carefully guarded his techniques, knowing this was his only chance of keeping ahead of the other workers once they became aware of his work. But with his funds cut off, he called in the press, hoping to attract other backing. So on September 2, 1928, he gave a demonstration. His story, and the fact that a young man of 22 had beat the big guns to the punch, caught their fancy, resulting in the following story.

San Francisco Chronicle

SAN FRANCISCO, CAL., MONDAY, SEPTEMBER 3, 1928

S. F. Man's Invention to Revolutionize Television

NEW PLAN BANS ROTATING DISC IN BLACK LIGHT

W. W. Crocker, R. N. Bishop
Head Local Capitalists
Backing Genius

Two major advances in television were announced yesterday by a young inventor who has been working in the laboratory of the San Francisco Chronicle. The new plan bans the use of the rotating disc, which has been the basis of all previous television systems, and instead uses a new principle of light and the image results.

The inventor is Philo T. Farnsworth, a young man of 22, who has been working in the laboratory of the San Francisco Chronicle. The new plan bans the use of the rotating disc, which has been the basis of all previous television systems, and instead uses a new principle of light and the image results.

The system is thus simple in the extreme and one of the major mechanical obstacles in the perfection of television is thereby removed. It was through this simplicity that he achieved his second great advance, the cutting in half of the wave band width necessary to get a television broadcast interference with other radio waves.

Young Genius and Part of His New Black Light Machine



Philo T. Farnsworth holding the sending and receiving tubes of his new television set.

In January of 1929, McCargar, Everson and Farnsworth formed Television, Inc., and paid off the other backers in stock, thereby allowing Phil to continue with his resolve to take television to the stage of public broadcasting.

Phil's first four television patents were filed on January 7, 1927. Three of these were issued in 1930. Then, as he solved one basic problem after another, there was a steady stream of patents. From the first filing date to October 9, 1940 there were 107 patents filed, all of which were granted, although several were fought over for up to eleven years before being issued to him.

At first the proponents of mechanical television were reluctant to accept the fact that they had been out-manuevered by the kid in San Francisco. But it soon became apparent that they were headed up a blind alley. To stay in the running, they had to go his way.

Dr. V.K. Zworykin, working at Westinghouse, had filed a patent application on a camera tube in 1923. His application was denied as being incapable of changing an optical image into an electrical image as claimed. He did build a cathode-ray-type receiver and gave a demonstration while still at Westinghouse, but he used a spinning disc at the transmitter.

In mid-May of 1930, Dr. Zworykin spent three days in the Farnsworth lab, supposedly evaluating Phil's work with the idea that Westinghouse was contemplating taking a license. He was shown everything, including tube techniques. When he saw Phil's operating television system, he said, "Beautiful! I wish I had invented it myself."

One of the demonstrations he saw was the crude electron microscope Phil used to study the forming of his fluorescent surfaces. Phil had discussed with me the need for this marvelous tool in the medical as well as other scientific fields. But he had neither the time nor money to develop it. He was glad to see that Dr. Zworykin went on to develop it and make it available (but it would have been nice to be given some credit for its beginning).

Soon we learned that Dr. Zworykin made his report to David Sarnoff, not Westinghouse. Sarnoff was maneuvering himself into the presidential chair of RCA and with Dr. Zworykin he hoped to control the television industry as he had radio. Later that year, he made a personal visit to 202 Green Street. Phil was in Washington at the time, testifying at a Congressional hearing regarding band-waves needed for television. Although Mr. Sarnoff seemed quite pleased with the demonstration he saw, he said RCA would not need anything from Farnsworth.

Within a year he offered to buy Farnsworth out for \$200,000 provided Phil came with it. Phil flatly refused, thereby setting the stage for the long drawn-out battle between Farnsworth and RCA.

In May of 1931, Philco, then leading the industry in radio sales, signed the first license agreement with Farnsworth. They hoped this would prevent RCA from getting a strangle-hold on television as they had on radio. As part of the agreement, Phil took his lab crew, leaving the San Francisco lab in the capable hands of Arch Brolly, an MIT graduate and former engineer for Federal. He set up a television lab and experimental broadcast station for Philco in Philadelphia. Their call letters were W3XE.

When RCA became aware of this, they gave Philco an ultimatum. Either they dump Farnsworth or they would not renew their licenses for radio parts. Phil sensed there was something going on behind his back, and, not sure whether or not George and Jess were involved, moved his men and equipment out of

Philco and set up his own lab. This became the eastern division of Farnsworth Television, Inc.

Phil had his first public showing at the Franklin Institute in Philadelphia in August, 1934. Since the Institute charged a fee to see it, you might say it was the first commercial television. These programs ran from 10:00 a.m. to 9:00 p.m. every day for two weeks. We got the first inkling of what it meant to fill the insatiable maw of television programming.

The Farnsworth receiving tube at that time gave a fifteen square inch picture of very good quality and the public flocked to see it. We had to refill the fifty-seat auditorium every fifteen minutes to accommodate the crowds.

Phil never lost sight of his goal of commercial television. But the FCC (Federal Communications Commission) refused to allot the necessary channels. He welcomed the patent interference with Dr. Zworykin in 1934, because that gentleman had already begun to take the credit for inventing television. In order to sell licenses under his patents, it was necessary to clarify his position.

In a lengthy ruling, the patent examiners ruled that Farnsworth was the originator of Electronic Television because Zworykin's tube was incapable of changing an optical image into an electrical image as claimed. In 1935, Zworykin appealed and the patent office upheld their 1934 ruling.

Farnsworth won over a dozen interferences from Zworykin. In the case of the Image Orthicon which infringed on at least five Farnsworth patents, the patent examiners were losing patience with RCA's unethical methods and not only awarded Farnsworth all of the claims, but would have given us the name as well, had it not been trademarked. This case caused RCA to throw in the towel and in 1938 they finally were forced to take a license from Farnsworth.

This was the first time they couldn't buy, or obtain what they wanted by other means, and it was a burr under Sarnoff's saddle.

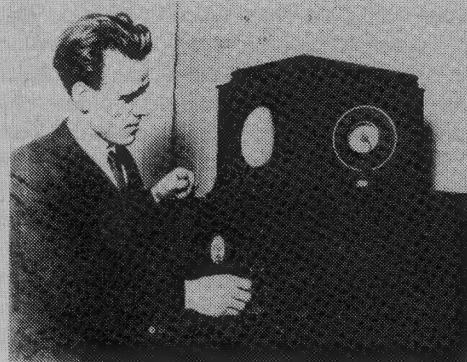
In 1936, Farnsworth built a television broadcast studio and tower in Wyndmoor, a suburb of Philadelphia. They were issued an experimental license (W3XPF). They had a steady stream of visitors from this country and also from many other nations around the world. Hitler was poised for war and they wanted to see what we had before the threatened hostilities prevented them from coming. At this time, Phil had a 441 line, 30 frames per second capability. The public was crying for it.

The news media was keeping close track of Phil, but when he told them television was ready, radio sales fell off. This would bring denials from RCA and other radio manufacturers. The poor public didn't know what to think.

The Federal Communication Commission finally issued an edict that the television industry must form a group and set standards, so that any receiver could receive any broadcast regardless of who made it. After many meetings, standards were finally decided upon, but the FCC still held up licenses for commercial broadcasting. The reason became obvious when the announcement was made that all research and development facilities were to be diverted to the defense of our Nation.

For fourteen years, Phil and his "Lab Gang" had worked long hours to gain and maintain their lead in electronic television. For the last four years, Phil's health had begun to show the results of this strain. The FCC announcement was the last straw. He went into the office of E.A. Nicholas, then the president of the company, and said, "I'm going fishing." We went to our summer place in Brownfield, Maine, where we stayed eight years.

Phil's secret work for the Pentagon, his other war projects, their losses in the 1947 forest fire and ultimate return to television and Fort Wayne, will be recounted in the forthcoming book by the author and her son, Philo T. Farnsworth, 3rd.



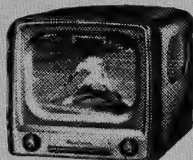
TELEVISION AFTER GREEN STREET

- 1927** Herbert Hoover, U.S. Sec. of Commerce, appears on first intercity television transmission, D.C. to New York (A.T. & T.)
- 1928** GE establishes experimental programming 3 days a week over WGY-TV in Schenectady, N.Y.; produces first live tv drama, *The Queen's Messenger* (2 camera).
- 1932** CBS inaugurates first regular schedule of tv broadcasting; N.Y. Mayor Jimmy Walker officiates, Kate Smith sings *When the Moon Comes Over the Mountain*.
- 1932** NBC becomes wholly owned RCA subsidiary, begins broadcasting from Empire State Bldg. CBS provides first coverage of Presidential election
- 1934** Congress passes Communications Act
RCA/Zworykin challenge Farnsworth patents; Farnsworth wins
- 1936** New York-Philadelphia coaxial cable ready for use
- 1937** NBC mobile unit in action in New York City
- 1939** RCA demonstrates television at World's Fair, markets 12 inch screen with pricetag of \$625
New Yorkers gather in stores to watch NBC's first televised prizefight (Lou Nova TKO's Max Baer in 11th)



- 1940** CBS beams first color transmission from Chrysler Bldg.
- 1941** First television commercial, for Bulova watch, airs over WNBT-NY (ad cost: \$9)
- 1945** Arthur C. Clarke postulates geo-synchronous orbit of satellites
- 1947** First World Series telecast, NBC to four cities: New York, Philadelphia, Washington and Schenectady (Yankees beat Dodgers in 7)
- 1948** Cable in use in rural Pennsylvania
- 1950** CBS institutes loyalty oath

- 1951** Edward R. Murrow hosts *See It Now* for CBS, premieres with split screen showing Brooklyn Bridge in New York and Golden Gate Bridge in San Francisco. Murrow states "For the first time in the history of mankind we are able to look out at the Atlantic and Pacific coasts of this great country at the same time."



- 1952** FCC reserves television channels for education Stevenson campaign spot pre-empts *I Love Lucy*; one viewer writes "I love Lucy. I like Ike. Drop dead."

Nixon *Checkers* speech

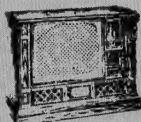
- 1953** KTHE-TV, first NET station, established on campus of USC

- 1954** RCA introduces color tv sets
Army-McCarthy hearings carried live by ABC

- 1955** Mary Martin is *Peter Pan* in first broadcast of Broadway show, watched by one of every two Americans

- 1956** Ampex introduces videotape

- 1958** *Twenty-One*/Charles Van Doren tv game show scandal



- 1961** FCC chairman Newton Minnow finds television "a vast wasteland"

- 1962** Telestar provides first satellite relay of tv pictures

- 1963** Kennedy assassination rivets world through four days of coverage

Beverly Hillbillies hits #1 in the ratings

- 1964** "Instant Replay" added to sportscasts

- 1965** Paik at Cafe a Go-Go shows his first videotapes, made with prototype portapak purchased that day

Early Bird geo-synchronous satellite premieres with one hour show seen by 30 million in Europe and the Americas

- 1966** FCC assumes jurisdiction over cable television

- 1967** Congress establishes PBS
Rockefeller Foundation underwrites Experimental TV Workshops in New York, Boston and San Francisco

Sony markets first portable video recorders

- 1969** Estimated 600 million in 49 countries watch live telecast of Astronaut Neil Armstrong's first step on the moon

- 1970** Sony introduces 1/2 inch color portapak
NYSCA establishes Television/Media Program
Radical Software begins publication

- 1971** Ban on cigarette advertising on TV
The three networks follow Nixon to China

- 1972** TVTV's *Four More Years*, first 1/2 inch portapak documentary broadcast (Group W)
Castelli-Sonnabend Tapes and Films

- 1973** NEA establishes Artists' Fellowships in Video
Electronic Arts Intermix

Televised Watergate hearings top summer daytime ratings

- 1974** Nixon ends long tv career with resignation statement

DCTV's *Cuba: The People*, first 1/2 inch color portapak documentary aired nationally on PBS



- 1974** Sony introduces Betamax home VCR
Time-Life inaugurates HBO, nation's first premium cable service, delivered by RCA's Satcom I

- 1977** Warner installs QUBE interactive cable in Columbus

- 1978** PBS becomes first national satellite network, connected by Western Union's Westar I
First videodisc players on sale in Atlanta, go in one hour

- 1979** FCC rules receive-only dishes need not be licensed

Architecture Machine Group at M.I.T. produces first interactive videodisc "moviemap" (Aspen Project)

- 1980** FCC staff urges "hands-off" policy regarding DBS

Comsat announces intent to offer nation's first DBS service

John Boter's Channel 26 in Bemidji, Minnesota (pop. 11,000) is first Low Power (LP)TV with advertising revenues of \$2,000 per high school football game

- 1981** NHK develops High Definition TV, Coppola claims credit

- 1982** Sony markets Betacam 1/2" for 1" system

- 1983** M*A*S*H finale commercial rates set all time record: \$450,000/30 seconds

*This chronology derived much from: Wallechinsky and Wallace, **The People's Almanac**, Doubleday, 195; Eric Barnouw, **Tube of Plenty**, Oxford University Press, 1981; and Willoughby Sharp, "Toward the Teleculture, Parts I and II," *Impulse Magazine*, Summer 79 and Fall 79, and "Telecommunications in the Space Shuttle Era," *VIDEO 80 Magazine*, Spring 81.*